**Insect research &**

**Scientific Engagement**

ENY 2890

3 credits, no prerequisites

**Meeting time & location:** Entomology and Nematology Departmen**t**

*Tuesday:* Period 6, 12:50–1:40 pm, Room 1027; Period 7, 1:55–2:45 pm, Room 1031

*Thursday:* Periods 6 & 7, 12:50–2:45 pm, Room 1031

**Teaching team for Fall 2018.**

All instructors are available to meet with students by appointment.

**Dr. Christine Miller**, Professor and Principle Investigator, cwmiller@ufl.edu,

 Office hours: 2:45 to 3:30 Tues, 2101 Steinmetz Hall

**Dr. Michael Forthman,** Postdoctoral Associate, mforthman@ufl.edu

 Contact Dr. Forthman for help with subject matter, analytical issues, and

absences.

**Ms. Laurel Lietzenmayer**,Ph.D. Graduate Student, lblietzenmayer@ufl.edu

Contact Ms. Lietzenmayer for help with presentations, interview and CREATE

questions

**Ms. Daniela Wilner**, M.S. Graduate Student, danielawilner@ufl.edu

 Contact Ms. Wilner for help with presentations

**Course description**

This is a Classroom Undergraduate Research Experience (CURE) course. Students become part of a research team, collecting publishable data on evolutionary biology, ecology, and behavior using insects. This course bridges the divide between the classroom and the science laboratory. This course will prepare students for advanced opportunities in science.

This course mimics a laboratory research experience in several ways: 1) students gather data that will be used in scientific studies and published in the primary scientific literature, 2) our class meetings resemble lab meetings where researchers come together to discuss important topics in science, 3) your instructors (including experienced undergraduate students, graduate students, and a postdoctoral researcher) will also serve as your research mentors, with the mentoring structure resembling that of a research laboratory.

While this course has elements that resemble laboratory research experiences, it finds its home in the classroom. As such, we will

incorporate some of the more positive elements of classroom learning. For example, the learning experience will have greater structure than is commonly provided in laboratories, and students will collect data almost immediately (in many laboratories, beginning assistants do not collect data for a semester or longer!). Additionally, this course will include a larger community of beginning researchers than is typically found in a laboratory. You will have many opportunities to exchange ideas with your cohort and become part of a learning community. Committed and hard-working students leave this course prepared to join research teams at UF and beyond.

**Course learning objectives:**

By the end of the course, dedicated students will:

1. Be able to explain in depth how scientists engage in research
2. Identify how their work as part of this course will contribute to the scientific body of knowledge
3. Develop enhanced critical thinking skills to assess the relevance and importance of scientific findings
4. Design a simple experiment
5. Recognize of the major challenges for conveying scientific findings to the general public and be able to explain how to overcome these challenges
6. Demonstrate competency in at least one method of data collection using insects
7. Be able to identify several other research opportunities on campus
8. Identify, describe, and explain global and intercultural conditions and interdependencies.
9. Analyze and interpret global and intercultural issues.
10. Communicate effectively with members of other cultures.

**Materials:**

* **Required:** Access to a PC or Mac laptop or desktop computer for data entry. ***You must be able to install phylogenetically related software onto these computers.*** List of required and recommended software will be provided on CANVAS for the relevant weeks.
* **Required:** Baum, D.A. & Smith, S.D.(2013).*Tree Thinking: An Introduction to Phylogenetic Biology*. Macmillan Learning; <https://www.macmillanlearning.com/Catalog/product/treethinkinganintroductiontophylogeneticbiology-firstedition-baum>
* **Required:** Access to the University of Florida Research Computing. We will go over this in class.
* ****All other reading materials and media will be available on Canvas or freely available on the internet.

**Evaluation of learning/research accomplishment:**

|  |  |  |
| --- | --- | --- |
| **Source of points** | **Points possible** | **Due dates** |
| Tree thinking pretest | 15 | Aug. 27 |
| “What are the benefits and challenges of conducting science across borders?”  | 20 | Aug. 29 |
| Presentation of primary literature (a four-part assignment, 25 points per assignment) | 100 | Sign up by Sep. 10 |
| Contact international researcher to set up interview | 10 | By Sep. 23 |
| Canvas quizzes (10 quizzes, 10pts/each) | 100 | See schedule |
| Participation (29 meetings at 5pts/each) | 145 | Throughout |
| Data collection accuracy | 75 | Throughout |
| C.R.E.A.T.E. Assignments (8 assignments, 10pts/each) | 80 | See schedule |
| Transcript of interview with international researcher | 25 | Oct. 31 |
| Online discussion participation (7 discussion topics at 10pts/each | 70 | See schedule |
| “What are benefits and challenges of conducting science across borders?” EssayReflective essay, including excerpts from the interview with the international researcher. | 60 | Nov. 28 |
| Total | **700** |   |

Up to **10** bonus points are available for attending a UF international science event and preparing a 2 page, single space reflection essay. These must be turned in by November 14th to be eligible to receive the bonus points.

**Grade and associated percent ranges %**

**A 93-100 A- 90-92 B+ 88-89**

**B 83-87 B- 80-82 C+ 78-79**

**C 73-77 C- 70-72 D+ 68-69**

**D 63-67 D- 60-62 E <60**

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**Explanation of course activities and grading:**

Evaluation of performance is based on fifteen assessments and participation in the course. This course does not have exams.

**Participation** is important, and this is reflected in your course grade! Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. Students are expected to be active participants in this course. In-class assignments will provide students an opportunity to contribute and receive points for those contributions. Please note that we will expect all students to participate in discussions and will design activities to facilitate this process. This is a “flipped classroom” course.

Preparation for in-class discussions. **Online quizzes** must be completed the night prior to weekly discussions. These will involve answering a set of questions based on the reading(s) and providing thoughtful discussion points or questions that you plan to bring up in the next class. These assignments are designed to help students focus on the material that will be addressed during the class discussions and prepare students to participate fully in the discussions. These assignments will be posted by Friday evening and must be completed the night before class (or you will lose 5 points/day).

**Presentations** are an opportunity for students to deeply analyze a peer-reviewed scientific paper and present the material to the class, gaining public speaking skills and critical thinking skills. Students will work in groups of four or five, and each group must choose a topic from the provided list by early in the semester. An instructor will work with the students to prepare presentations.

**Interviews** give you a chance to meet 1:1 with an international researcher, usually a graduate student, and discuss some of the challenges they have faced while working across international borders. Transcripts are graded for format and for following the guidelines available on Canvas. This interview will also become part of your final essay for the class, “What are the benefits and challenges of conducting research internationally?” Essay.

**Data collection accuracy** is graded to ensure that we actually can use these data to make scientific conclusions. It is easy to get sloppy in data collection if there is no accountability. You will receive a lot of guidance in how to collect data accurately. You are expected to make an appointment with the designated instructor if you are having any problems. Each week you will be assigned work to do. We will check a subset of your work for accuracy. If your recorded data is considered accurate or very close, you will receive accuracy points. As an

additional means of ensuring data accuracy, multiple students will collect data from thesame insects in the course. Each weekly set of data is due on Sunday night. *You should plan to allocate approximately 5 hours to data collection weekly* ***outside*** *of class time.*

**Due dates are firm**, unless you have a valid excuse (again, see UF policy,<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>). If you know you have a conflict with something, inform us right away! We follow a **5pt/day** deduction late work policy.

**Class/Research Schedule.** Tuesday meetings are typically guided classroom discussions on a topic, Thursdays are typically for data collection and presentations.This is the schedule for this semester as we have planned; however, we reserve the right to make modifications and changes where we see fit as constraints or opportunities arise. It is the students’ responsibility to visit Canvas weekly to get updates and the plan for the week.

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| **Week** | **Day** | **Topic** | **Weekly assignment due dates** |
| **Week 1** | ThursdayAug. 23 | Welcome to the course: IntroductionsThe Nature of ScienceAsking a question when science does not know the answer | Tree thinking pretest: Friday, Aug. 24, 11:59 pm |
| **Week 2** | TuesdayAug. 28 | Research this semester: Phylogenetic research & its importanceInterpretation & analysis of scientific manuscripts (CREATE method) | Canvas Quiz 1: Monday Aug. 27, 11:59 pm Benefits & challenges of conducting science across borders: Wednesday Aug. 29, 11:59 pm |
|  | ThursdayAug. 30 | Tree thinking and interpretationUF Research Computing: HiPerGator Training |  |
| **Week 3** | TuesdaySep. 4 | What is a species and how can speciation happen? Phylogenetics and global conservation | Canvas Quiz 2: Monday Sep. 3, 11:59 pmDiscussion 1: Wednesday Sep. 5, 11:59 pm |
|  | ThursdaySep. 6 | Characters, homology, & our data**Exercise:** Aligning DNA sequences | CREATE 1: Thursday in class |
| **Week 4** | TuesdaySep. 11 | Global science: why work across borders? | Canvas Quiz 3: Monday Sep. 10, 11:59 pmGroup presentation paper selection: Monday Sep. 10, 11:59 pmDiscussion 2: Wednesday Sep. 12, 11:59 pm |
|  | ThursdaySep. 13 | Models in science**Exercise:** Models of sequence evolution |  |
| **Week 5** | TuesdaySep. 18 | Objectivity & evaluation in science | Canvas Quiz 4: Monday Sep. 17, 11:59 pmGroup presentation assignment 1: Friday, Sep. 18, 11:59 pm Discussion 3: Wednesday Sep. 19, 11:59 pm |
|  | ThursdaySep. 20 | Tree building methods part 1: Distance methods & parsimonyMeasures of support: Jackknife and bootstrap**Exercise:** Parsimony phylogenetic analysis | CREATE 2: Thursday in class |
| **Week 6** | TuesdaySep. 25 | Science & the media Whom will this study inform?Preparation for interviews  | Contact international researcher: Sunday Sep. 23, 11:59 pmCanvas Quiz 5: Monday Sep. 24, 11:59 pm |
|  | ThursdaySep. 27 | Tree building methods part 2: Maximum likelihood & Bayesian inference**Exercise:** Maximum likelihood phylogenetic analysis |  |
| **Week 7** | TuesdayOct. 2 | Science communication to a broad audience | Canvas Quiz 6: Monday Oct. 1, 11:59 pmDiscussion 4: Wednesday Oct. 2, 11:59 pmCREATE 3: Tuesday in class |
|  | ThursdayOct. 4 | Tree building methods part 3: Species trees and gene trees**Exercise:** Summary coalescent analysis |  |
| **Week 8** | TuesdayOct. 9 | Science ethics | Canvas Quiz 7: Monday Oct. 8, 11:59 pmGroup presentation assignment 2: practice talks at scheduled times this week |
|  | ThursdayOct. 11 | **Exploring data:** Interpreting last week’s phylogenetic resultsIntegrating morphology in a molecular evolutionary framework part 1: How to objectively identify morphological characters and character states**Exercise:** Developing a morphological character matrix |  |
| **Week 9**  | TuesdayOct. 16 | Public trust & distrust of science across borders | Data submission: Tuesday Oct. 16, 11:59 pm Discussion 5: Wednesday Oct. 17, 11:59 pm |
|  | ThursdayOct. 18 | Revisiting morphological matrix exercise**Data collection:** Coding morphology |  |
| **Week 10** | TuesdayOct. 23 | Climate change: What is the discussion? | Data submission: Tuesday Oct. 23, 11:59 pmDiscussion 6: Wednesday Oct. 24, 11:59 pmGroup presentation assignment 3, Friday Oct. 26, 11:59 pm |
|  | ThursdayOct. 25 | Your future research: Discussion of opportunities, concerns, & applications (research panel) **Data collection:** Coding morphology |  |
| **Week 11**  | TuesdayOct. 30 | Guest speakers: International undergraduate & graduate students | Data submission: Tuesday Oct. 30, 11:59 pm International interviews: Wed, Oct. 31, 11:59 pm |
|  | ThursdayNov. 1 | Applications of phylogenetic results part 1: Morphological trait evolution**Data collection:** Coding morphology |   |
| **Week 12**  | TuesdayNov. 6 | Guest speakers: Faculty researchersPreparation for final group presentations | Canvas Quiz 8: Monday Nov. 5, 11:59 pm Data submission: Tuesday Nov. 6, 11:59 pm Discussion 7: Monday Nov. 5, 11:59 pm |
|  | ThursdayNov. 8 | Applications of phylogenetic results part 2: Historical biogeography & coevolution**Data collection:** Coding morphology | CREATE 4: Thursday in class |
| **Week 13** | TuesdayNov. 13 | Presentations | Canvas Quiz 9: Monday Nov. 12, 11:59 pm CREATE 6–8: Tuesday in class |
|  | ThursdayNov. 15 | Applications of phylogenetic results part 3: Ecological & behavioral traits**Data collection:** Finish coding morphology | CREATE 5: Thursday in class |
| **Week 14**  | TuesdayNov. 20 | Integrating morphology in a molecular evolutionary framework part: Ancestral state reconstruction methods**Exercise:** Ancestral state reconstruction | Canvas Quiz 10: Monday Nov. 19, 11:59 pm |
|  | ThursdayNov. 22 | Holiday  |  |
| **Week 15**  | TuesdayNov. 27 | **Exploring data:** Interpreting ancestral state reconstructions | Benefits & challenges of conducting science across borders essay: Wednesday Nov. 28, 11:59 pm |
|  | ThursdayNov. 29 | Research this semester: what have we found?Discuss potential future directions based on our data |  |
| **Week 16**  | TuesdayDec. 4 | Focus Groups: Sign up for a time |   |

**Grades and Grade Points**

For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Attendance and Make-Up Work**

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

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**Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at<https://evaluations.ufl.edu/results>. We also will ask students to please complete optional pre-course and post-course surveys and to attend focus groups.

**Academic Honesty**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see:<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

**Software Use:** All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

**Services for Students with Disabilities:** The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer

equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

**Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

· University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/) Counseling Services Groups and Workshops Outreach and Consultation Self-Help Library Wellness Coaching

· U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)

· Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)

**Student Complaints**:<https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf>

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